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ABSTRACT:

PROBLEM TO BE SOLVED: To obtain a food for a cancer prevention containing isoflavones obtained by effecting microorganisms to a soybean milk and to provide a method for producing the same.

SOLUTION: This food a cancer prevention is obtained by effecting one kind or two or more kinds microorganism selected from microorganisms belonging to the genuses of Lactobacillus, Bifidobacterium, Streptococcus, Bacillus, Saccharomyces, Torulaspora and Candida and having an activity of isolating isoflavones by affecting isoflavone glycoside in a soybean milk, and can prevent the cancer safely, and the method for prducing the same.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the cancer prevention food containing the isoflavone which a microorganism is made to act on soybean milk and is obtained, and its manufacture approach.
[0002]
[Description of the Prior Art] Isoflavone is contained in the soybean 0.1 to 0.4% of the weight (only henceforth "%"), and the most exists in the form of glycosides, such as genistin and daizin. Genistein and the die zein which are the aglycon of this genistin and daizin are matter with which the chemistry preventive effect over cancer is expected. As an anti-cancer-related operation which genistein and a die zein show The female sex hormone's operation () [K.D.R.] Setchell and In Estrogens in the Environment, ed by J.A.McLachlan, pp60 - 85 p Elsevier Science Publishing Co, Inc, New York, and 1985, The inhibitory action of tyrosine kinase activity (T.Akiyama, et al, J.Biol.Chem., 262, 5592, 1987), The depressant action of cancer cell transition (S.C.Mueller et al, J.Cell Biol, 119, 1309, 1992), The inhibitory action of the vascularization (T.Fotsis, et al, Proc.Natl.Acad Sci.USA, 90, 2690, 1993), The growth inhibition of a culture cancer cell (A.Okura, et al, Biochem.Biophys.Res.Commun, 157, 183, 1988), Control of an oncogene manifestation (J.Zwiller, et al, Oncogene, 6, 219, 1991), Control of experimental carcinogenesis (O.P.Sharma, et al, J.Steroid Biochem.Mol.Biol, 43, 557, 1992), Control of the atypical KURIPUTO generation in a colonic epithelium (V.E.Steele, et al, J.Nutr, 125, 713S, 1995), Promotion of differentiation inducing of a cancer cell (K.Kiguchi, et al, Cancer Commun, 2, 271, 1990), Antioxidation activity, anti-inflammatory activity (H.Wei, et al, Nutr.Cancer, 20, 1, and 1993), etc. are known.
[0003] As functions other than the anti-cancer operation which isoflavone has a blood serum LDL fall operation (it Balmis(es) F. --) et al, J.Nutr, and 125, 803S, control of 1995 or osteoclasis () [JJ.] Anderson, et al, J.Nutr, 125, 799S, 1995, control (W.Krol, et al, Biochem Phamacol, 50, 1031, 1995) of nitrogen-monoxide generation of a macrophage, etc. are known. A lipid metabolism improvement effect, the anti-arteriosclerosis effectiveness, the anti-osteoporosis effectiveness, or the anti-inflammation effectiveness is expected. in addition, as food with which the isoflavone (genistein, die zein, etc.) of the aglycon considered to have a chemistry preventive effect over cancer is contained The fermented food of soybeans, such as a tempeh and bean paste, is known (). [H.] Wang and P.A.Murphy, J.Agric.Food Chem, 42, 1666, 1994;H.Wang and P.A.Murphy, J.Agric.Food Chem, 42, 1674, 1994.
[0004] Then, although it is possible to manufacture the food containing genistein or a die zein using the soybean milk which is the adding-water extract of an soybean, in many cases, isoflavone decreases in number in the manufacture process of these food, and there are few these contents in a final product. For example, as for tofu, the total isoflavone content will decrease greatly in process of adding-water processing.
[0005]
[Problem(s) to be Solved by the Invention] Therefore, the purpose of this invention is to offer food with a cancer preventive effect, and its manufacture approach, including isoflavone so much.
[0006]
[Means for Solving the Problem] As a result of inquiring wholeheartedly in view of this actual

condition so that this invention persons may get the food which contains isoflavone so much, when a microorganism with the capacity to separate isoflavone from an isoflavone glycoside was screened and this processed soybean milk, header this invention was completed for the cancer prevention food which contains isoflavone so much being obtained.
[0007] This invention Namely, the Lactobacillus group microorganism, the Bifidobacterium microorganism, A streptococcus group microorganism, the Bacillus microorganism, the Saccharomyces microorganism, They are a kind or two sorts or more of microorganisms chosen from a genus Torulaspora microorganism and the Candida microorganism. Invention of the second of the manufacture approach of the cancer prevention food characterized by making the first invention and this microorganism of the cancer prevention food which a microorganism with the capacity to act on the isoflavone glycoside in soybean milk, and to separate isoflavone is made to act on soybean milk, and is obtained act on soybean milk is offered.
[0008]
[Embodiment of the Invention] Although what used the MARUDAI beans, a self-renewal soybean, or a flake soybean containing fats and oils etc. as the raw material is desirable as for the soybean milk which serves as a raw material in this invention, it may use a defatted soybean as a raw material.
[0009] By soybean milk adding the hot water which contains hot water or 0.5 - 1.0% of sodium carbonate after soaking a raw material in water, after grinding, although it can heat-sterilize further and can manufacture except for tofu lees, the soybean milk used by this invention may be manufactured by what kind of approach.
[0010] Sugar used for soybean milk at food, such as cane sugar, grape sugar, fruit sugar, and invert sugar, for next microorganism treatment; a nutrient required for growth of microorganisms, such as a meat extract, a peptone, a yeast extract, and a peptide, may be added. Moreover, in order to adjust to the optimal pH of a microorganism, the acid used for soybean milk at food, such as a citric acid, a malic acid, an ascorbic acid, a lactic acid, and an acetic acid, may be added.
[0011] The cancer prevention food of this invention makes a microorganism act on soybean milk, and is obtained. The microorganism used here has a kind or two sorts or more of desirable microorganisms which there is capacity to act on the isoflavone glycoside in soybean milk, and to separate isoflavone, and are chosen from the Lactobacillus group microorganism, the Bifidobacterium microorganism, a streptococcus group microorganism, the Bacillus microorganism, the Saccharomyces microorganism, a genus Torulaspora microorganism, and the Candida microorganism. Specifically, the following microorganism is mentioned.
Lactobacillus acidophilus YIT 0168(FERM P-6262) Lactobacillus acidophilus JCM 1229 Lactobacillus gasseri DSM 20243 Lactobacillus plantarum ATCC 14947 Lactobacillus buchneri ATCC 4005 Lactobacillus casei ATCC 393 Lactobacillus casei YIT 9029 (FERM BP-1366) Lactobacillus johnsonii JCM 2012 Lactobacillus gallinarum JCM 2011 Lactobacillus amylovorus JCM 1126 Lactobacillus brevis ATCC 14869 Lactobacillus rhamnosus ATCC 7469 Lactobacillus rhamnosus ATCC 53103 Lactobacillus kefir NRIC 1693 Lactobacillus paracasei NCDO 151 Lactobacillus crispatus JCM 1185 Streptoccocus thermophilus YIT 2001 (FERM P-11891) Bifidobacterium bifidum YIT 4060 (FERM P-15489) Bifidobacterium longum YIT 4078 (FERM P-15490) Bifidobacterium adolescentis ATCC 15703 Bifidobacterium infantis ATCC 25962 Bifidobacterium breve YIT 4065 (FERM P-15488) Bacillussubtilis IFO 3336 Saccharomyces cerevisiae IFO 2018 Saccharomyces cerevisiae ATCC 32120 Saccharomyces cerevisiae AJ 5260 Saccharomyces bayanusCBS 425 Torulaspora delbrueckii CBS 705

Torulaspora delbrueckii IFO 425 Candida kefyr IFO 10287 That from which the amount of isoflavone becomes 4 or more times of unsettled soybean milk as a desirable microorganism among these especially, i.e., the rate of increase, is 300% or more of thing.
[0012] After inoculating into the above-mentioned soybean milk liquid the fungus liquid of the microorganism which it was not limited, for example, was cultivated, especially the method of making the above-mentioned microorganism act on soybean milk should just ferment by determining conditions, such as permeability, suitably, if they are the temperature suitable for the microorganism, time amount, and aerobe. In addition, fermentation may be the mixed fermentation which combined two or more sorts of strain, and may be the continuous fermentation which combined two or more sorts of strain.
[0013] Although the soybean milk on which the microorganism was made to act can be produced commercially as cancer prevention food as it is, it may add the additive usually used for food or oral drugs. As an additive used here, a saccharide, protein, a lipid, vitamins, a plant extract, an animal extract, a microorganism extract, perfume, a coloring agent, etc. are mentioned. Moreover, as cancer prevention food, it is not restricted to a soybean milk drink, but various things, such as soybean milk yogurt, a soybean milk pudding, and tofu, are mentioned.
[0014]
[Effect of the Invention] Since the cancer prevention food of this invention contains isoflavone with cancer preventive effects, such as a die zein and genistein, so much, while a cancer preventive effect is expectable, it is safe food. Moreover, since a die zein and genistein show the antioxidation activity over active oxygen, this invention food can also expect antioxidation activity.
[0015]
[Example] Although an example is given below and this invention is further explained to a detail, this invention is not limited to these.
[0016] Microorganism treatment of example 1 (1) soybean milk (fermentation)
base -- after mixing 10g of grape sugars with 1kg (5% of crude protein, 3% of crude fat, Brix 12, pH7.4) of soybean milk and adjusting to pH6.8 by the citric acid, wet sterilization was carried out for 90 minutes, and 100 degree C of ****** for fermentation were prepared. After inoculating into the above-mentioned soybean milk liquid the fungus liquid of the microorganism (Table 1) which carried out preculture, stationary culture only of the culture time amount from which fermentation is checked at 30 degrees C or 37 degrees C was carried out. In addition, in aerobic fermentation, after it carried out the plug for the culture container with the permeability of a cotton plug or a silicon plug and nitrogen permuted the gaseous phase of a culture container in anaerobic fermentation, it sealed. As shown in the result table 1, it was shown that soybean milk ferments and pH falls by each strain strain.
[0017]
[Table 1]

菌種			培養条件	培養温度（℃）	培養期間（日）	発酵物のpH
Lactobacillus	acidophilus	YIT 0168(FERM P-6262)	静置・好気	37	2	4.4
Lactobacillus	acidophilus	JCM 1229	静置・好気	37	2	5
Lactobacillus	gasseri	DSM 20243	静置・好気	37	2	4.5
Lactobacillus	plantarum	ATCC 14947	静置・好気	30	1	4.6
Lactobacillus	buchneri	ATCC 4005	静置・好気	37	6	4.4
Lactobacillus	casei	ATCC 393	静置・好気	37	1	4.1
Lactobacillus	casei	YIT 9029(FERM BP-1366)	静置・好気	37	1	4.1
Lactobacillus	johnsonii	JCM 2012	静置・好気	37	1	5.2
Lactobacillus	gallinarum	JCM 2011	静置・好気	37	6	4.2
Lactobacillus	amylovorus	JCM 1126	静置・好気	37	2	4.6
Lactobacillus	brevis	ATCC 14869	静置・好気	37	6	4.9
Lactobacillus	rhamnosus	ATCC 7469	静置・好気	37	1	4.2
Lactobacillus	rhamnosus	ATCC 53103	静置・好気	37	1	4.1
Lactobacillus	kefir	NRIC 1693	静置・好気	30	2	5.5
Lactobacillus	paracasei	NCDO 151	静置・好気	30	1	4.1
Lactobacillus	crispatus	JCM 1185	静置・好気	37	6	4.7
Streptoccocus	thermophilus	YIT 2001(FERM P-11891)	静置・好気	37	2	4.4
Bifidobacterium	bifidum	YIT 4060(FERM P-15489)	静置・嫌気	37	2	4.5
Bifidobacterium	longum	YIT 4078(FERM P-15490)	静置・嫌気	37	2	4.3
Bifidobacterium	adolescentis	ATCC 15703	静置・嫌気	37	2	4.9
Bifidobacterium	infantis	ATCC 25962	静置・嫌気	37	2	5
Bifidobacterium	breve	YIT 4065(FERM P-15488)	静置・嫌気	37	2	4.2

[0018] (2) After adding ethanol 3ml in 1ml of soybean milk fermentation objects obtained by measurement (1) of the isoflavone content in the soybean milk after microorganism treatment and mixing with them enough, the obtained supernatant liquid which carried out centrifugal separation was filtered with the membrane filter. The quantum of the isoflavone was carried out having covered this liquid over the high speed liquid chromatography. The conditions of high performance chromatography are column YMC-Pack. They are C4 (4.6 to 150 mm), 10% acetic acid of mobile phases / methanol solution (73:27), the column temperature of 50 degrees C, rate-of-flow 2 ml/min, and detection UV260nm. An isoflavone content is shown in Table 2.

[0019]

[Table 2]

豆乳の種類			ダイゼイン量（μg/mℓ）	増加率（%）	ゲニステイン量（μg/mℓ）	増加率（%）
素豆乳			2.7	0	2.2	0
Lactobacillus	acidophilus	YIT 0168(FERM P-6262)	26.6	885	59.6	2609
Lactobacillus	acidophilus	JCM 1229	16.6	515	54.5	2377
Lactobacillus	gasseri	DSM 20243	39.5	1363	100.1	4450
Lactobacillus	plantarum	ATCC 14947	104.5	3770	108.1	4814
Lactobacillus	buchneri	ATCC 4005	63.1	2237	97.5	4332
Lactobacillus	casei	ATCC 393	103.7	3741	137.2	6136
Lactobacillus	casei	YIT 9029(FERM BP-1366)	113.5	4104	141.8	6345
Lactobacillus	johnsonii	JCM 2012	21.6	700	45.3	1959
Lactobacillus	gallinarum	JCM 2011	66.1	2348	127.9	5714
Lactobacillus	amylovorus	JCM 1126	58.8	2078	108.9	4850
Lactobacillus	brevis	ATCC 14869	107.5	3881	126.2	5636
Lactobacillus	rhmnosus	ATCC 7469	110.9	4007	137.8	6164
Lactobacillus	rhmnosus	ATCC 53103	114.1	4126	143.9	6441
Lactobacillus	kefir	NRIC 1693	96.5	3474	107.8	4800
Lactobacillus	paracasei	NCDO 151	115.1	4163	141.8	6345
Lactobacillus	crispatus	JCM 1185	18.1	570	58.2	2545
Streptoccocus	thermophilus	YIT 2001(FERM P-11891)	4.1	52	4.5	105
Bifidobacterium	bifidum	YIT 4060(FERM P-15489)	71.6	2552	167	7491
Bifidobacterium	longum	YIT 4078(FERM P-15490)	3.7	37	4	82
Bifidobacterium	adolescentis	ATCC 15703	98.7	3556	170.7	7659
Bifidobacterium	infantis	ATCC 25962	10.8	300	30.6	1291
Bifidobacterium	breve	YIT 4065(FERM P-15488)	70.5	2511	183.3	8232

[0020] Lactobacillus casei, Lactobacillus paracasei, Lactobascillus brevis, Lactobacillus rhamnosus, Bifidobacterium breve, Bifidobacterium bifidum, and Bifidobacterium adolescentis had very high isoflavone generation ability. From this, manufacture of the soybean milk processed food containing isoflavone understands that the microorganism of each strain shown here is useful.
[0021] Measurement of the isoflavone content after processing of the soybean milk by example 2 aerobic bacteria, and processing: After inoculating the fungus liquid of the aerobic microorganism which carried out preculture to ****** for fermentation prepared in the example (1), shaking culture was aerobically carried out for two days, and 30 degrees C of fermentation

objects of soybean milk were obtained. According to the approach which showed these fermentation object to the example 1 (2), the quantum of the die zein and genistein which are isoflavone was carried out.

[0022]

[Table 3]

好気的微生物による豆乳の発酵物中のアグリコンのイソフラボン含量

豆乳の種類		培養条件	培養温度 (℃)	培養期間 (日)	ダイゼイン量 (μg／ml)	増加率 (%)	ゲニステイン量 (μg／ml)	増加率 (%)
煮豆乳					2.7	0	2.2	0
Bacillus subtilis	IFO 3336	振盪・好気	30	2	93.1	3348	106.9	4759
Saccharomyces cerevisiae	IFO 2018	振盪・好気	30	2	103.5	3733	119.2	5318
Saccharomyces cerevisiae	ATCC 32120	振盪・好気	30	2	99.7	3599	115.3	5141
Saccharomyces cerevisiae	AJ 5260	振盪・好気	30	2	104.6	3774	119.6	5336
Saccharomyces bayanus	CBS 425	振盪・好気	30	2	86.2	3093	86.5	3832
Torulaspora delbrueckii	CBS 705	振盪・好気	30	2	99.2	3574	116.2	5182
Torulaspora delbrueckii	IFO 425	振盪・好気	30	2	102.5	3696	120.1	5359
Candida kefyr	IFO 10287	振盪・好気	30	2	99.1	3570	115.3	5141

[0023] the soybean milk fermentation object according to each strain strain as shown in Table 3 -- base -- containing so much the die zein which is isoflavone, and genistein compared with soybean milk was shown. From this, manufacture of the soybean milk processed food containing isoflavone understands that these microorganisms are useful.

[Translation done.]